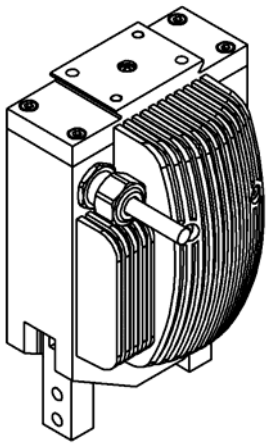

USER MANUAL

ELECTRICAL ANGULAR GRIPPER GWE

Mechanical Part

BA-100070
Starting from serial number 427121
English, edition 02/2008

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1. Important information

1.1. Introduction

This User Manual describes the mechanical design, technical data, load limits, installation, maintenance and spare parts of the GWE electrical angular gripper.

1.2. EU conformity (EU Directive on Machines, Appendix II A)

Rules and standards complied with:
Machinery guidelines 89/392/EEC, 91/368/EEC

Manufacturer:
Montech AG, Gewerbestrasse 12 CH–4552 Derendingen, Switzerland
Tel. +41 32 681 55 00, Fax +41 32 682 19 77

1.3. Product description and application

GWE electrical angular grippers are electrically operated, moment-controlled grippers for external gripping of parts. They are used wherever workpieces have to be regularly clamped for workpiece transport (handling).

The load limits which were specified by the technical data must be complied with in all circumstances. Overloading can lead to faults and failure of the devices.

1.4. Dangers

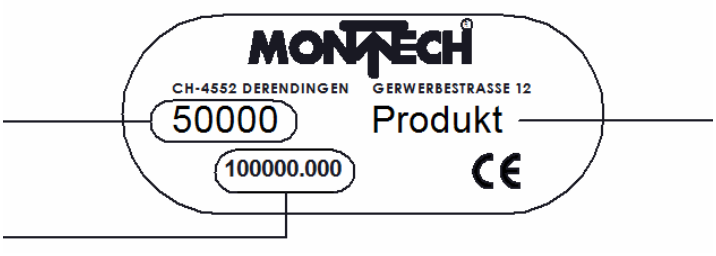
The use of GWE electrical angular grippers in an installation is permissible only when they are guarded by movable, isolating protective devices as per EN 292-2, para. 4.2.2.3. Failure to comply with this protective measure can result in injury due to fingers being squeezed or knocked, particularly in machines which start up automatically.
It is essential to comply with the operating conditions and safety instructions described in the controller User Manual. It is also essential to comply with the stated load limits.

- During operation, the surface of the motor may reach a temperatue of 100°C. The motor must not be touched if the temperature has exceeded 40°C (measurement of the surface temperature).
- During maintenance work on the GWE, it must be ensured that the drive energy has been switched off and cannot be switched on by unauthorized persons.

1.5. Additional information

The aim of the present User Manual is to enable users to employ GWE electrical angular grippers correctly and safely. Should further information be required in relation to your particular application, please contact the manufacturer.
When reordering User Manuals, it is essential to quote the reference number, the product name and serial number.
This document can be obtained from our homepage www.montech.com.

Name plate



Montech AG
Management

U. D. Wagner C. Wullschleger

1.6. Validity of the User Manual

Our products are continually updated to reflect the latest state of the art and practical experience. In line with product developments, our User Manuals are continually updated.
Every User Manual has an article number (e.g. BA-100020) and an edition number (e.g. 02/2008). The article number and the edition date are shown on the title page.

Validity

Full name	Short name	Reference number
Electrical Angular Gripper GWE	GWE	57834

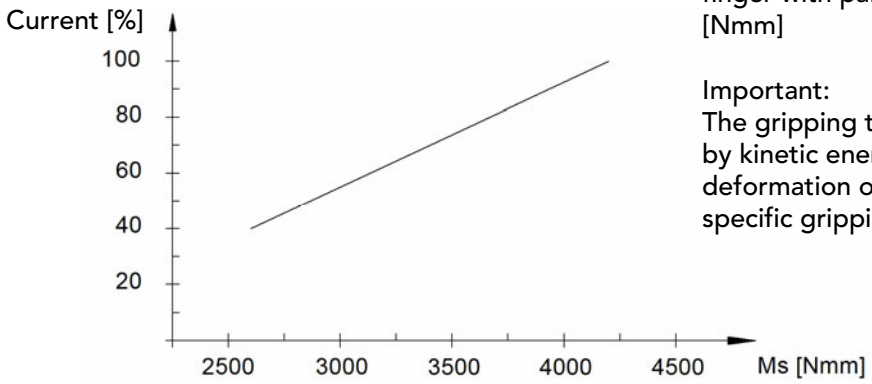
2. Technical Data

2.1. GWE Technical Data

Opening angle infinitely adjustable		[°]	15 - 180
Opening/closing time		[s]	See diagram
Weight		[kg]	0.95
Mass moment of inertia J_z (closed)		[kgcm^2]	6.1
Max. cycles per minute			80
Drive			Brushless electronic commutated DC motor, toothed belt and ballscrew
Rated motor power		[W]	25
Protection type			IP42
Repeatability	1)	[mm]	±0.05
Check on end position open/closed	2)		Inductive proximity switches
Supply voltage/current			24VDC / 1.5A
Ambient Temperature		[°C]	10…50
Rel. humidity			5%-85% (without condensation)
Air purity			Normal workshop atmosphere
Warranty period			2 years from the date of delivery
Mounting position			Any
Material			Aluminum, steel, bronze, plastic

Scatter of the clamped end position at Lz = 38 mm (end of jaw), measured for 100 successive strokes at constant motor temperature
See accessories

2.2. GWE gripping force diagram with Speed > 50%

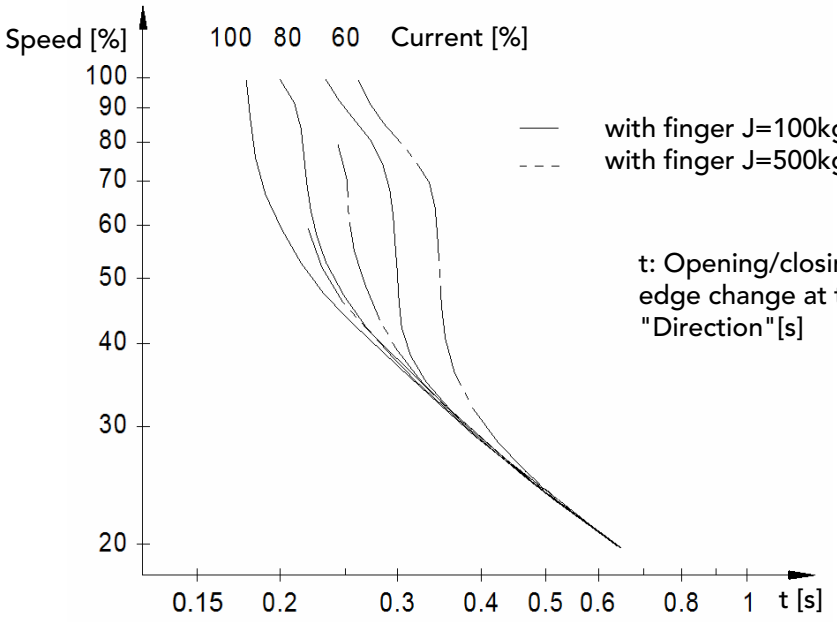


Ms: Gripping torque per gripper finger with parallel jaw position [Nmm]

Important:
The gripping torque is influenced by kinetic energy and the deformation of the application-specific gripping finger!

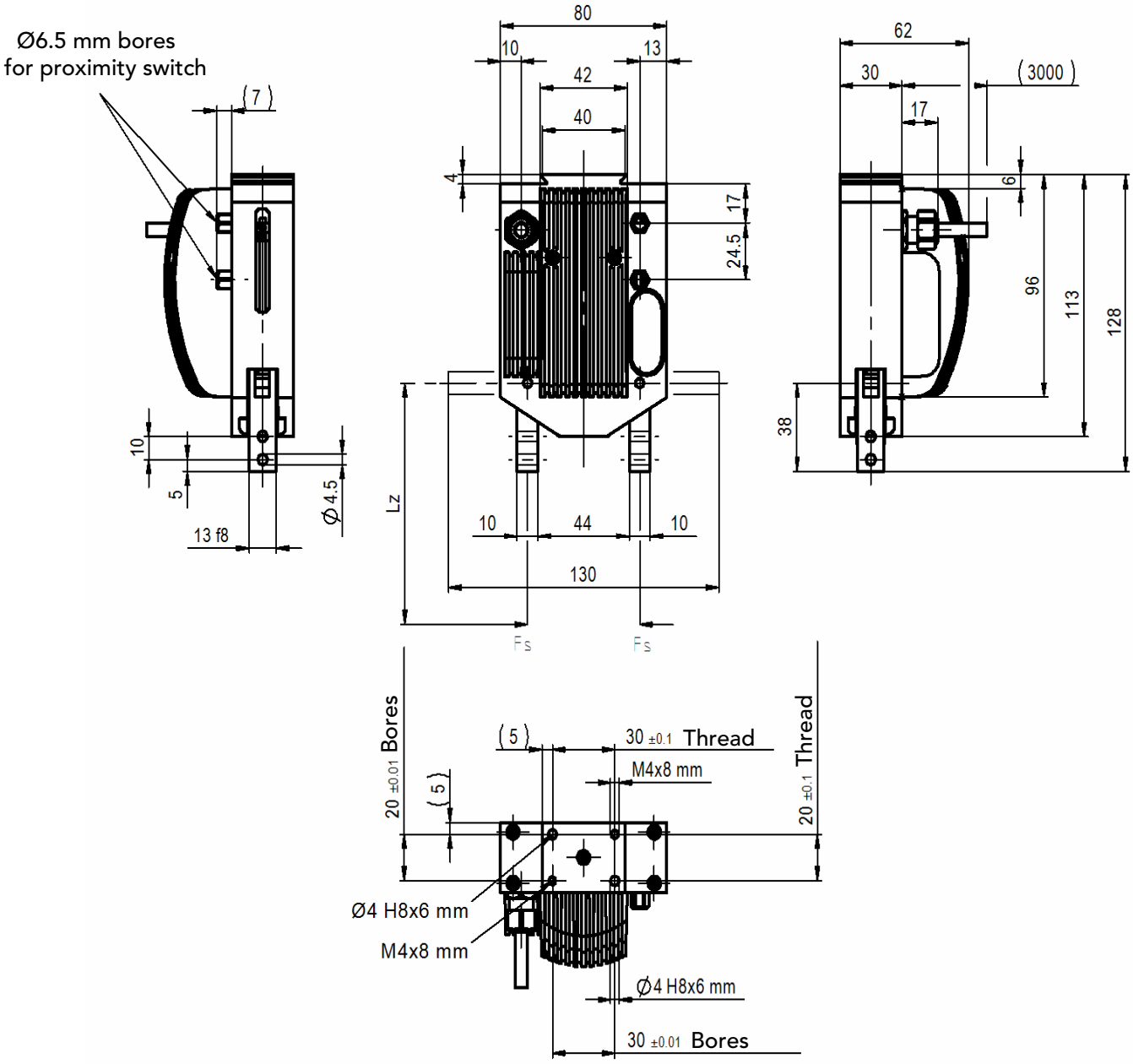
2.3. GWE opening and closing times

- The speed should be throttled so that there is no hitting in the end position! Moving to the end positions with hitting has a negative impact on the service life and may result in early failure!
- By setting the largest permissible opening and closing times, the gripper is subject to less wear and tear and service life is increased.



t: Opening/closing times from edge change at the input "Direction"[s]

2.4. Dimensional drawing GWE



Reference number	
GWE	57834

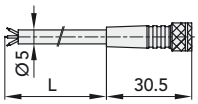
2.5. Scope of delivery

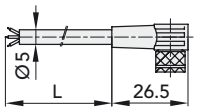
– Mechanical part including 3 m cable with loose ends for connecting to the ECMR controller.
– 3 m cable: unshielded and towable.
– ECMR controller completely configured with all counter connection terminals for connecting the loose wires.
– CD-ROM with Windows commissioning software and Operating Instructions in German, English, French and Italian.

2.6. GWE accessories

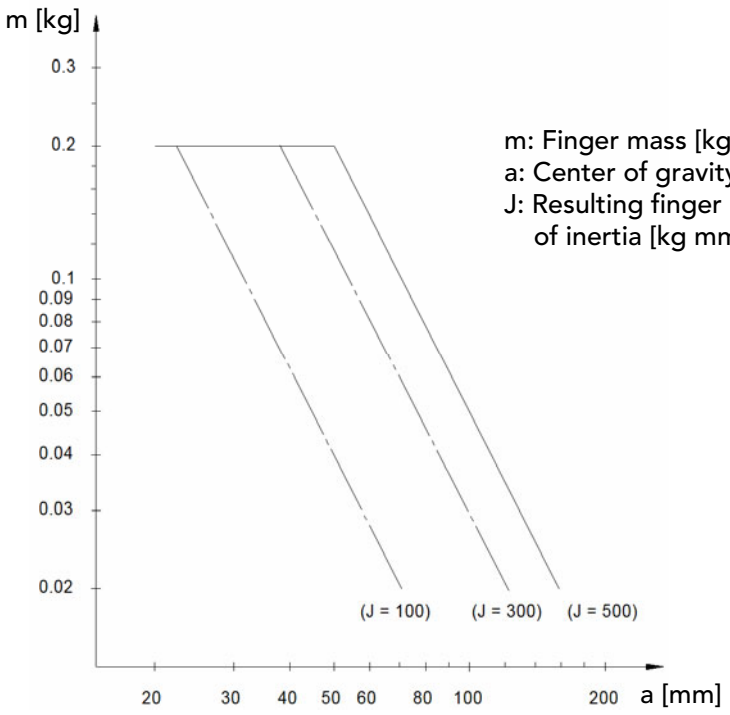
Inductive proximity switches PNP Ø 6.5 mm with LED, protection against shortcircuits and reverse pin connection, switch gap 2 mm, flush-mountable	Ref. no.
Length 2 m	508842
Pluggable M8x1	508843

Connecting cable	Ref. no.
for 3-pin proximity switch, highly flexible, screwable M8x1[1)]	
5 m, with socket straight on one side	504610
5 m, with socket angled on one side	504929
10 m, with socket straight on one side	507528
10 m, with socket angled on one side	507529
[1)] especially suitable for dynamic stress, for example if installed in energy supply chain.	



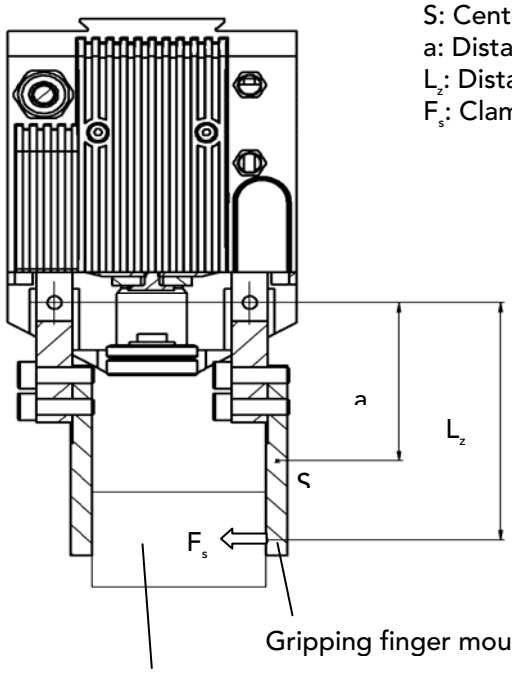


2.7. Permitted finger dimensions GWE



m: Finger mass [kg]
a: Center of gravity distance [mm]
J: Resulting finger mass moment of inertia [kg mm^2]

Definition of center of gravity distance a



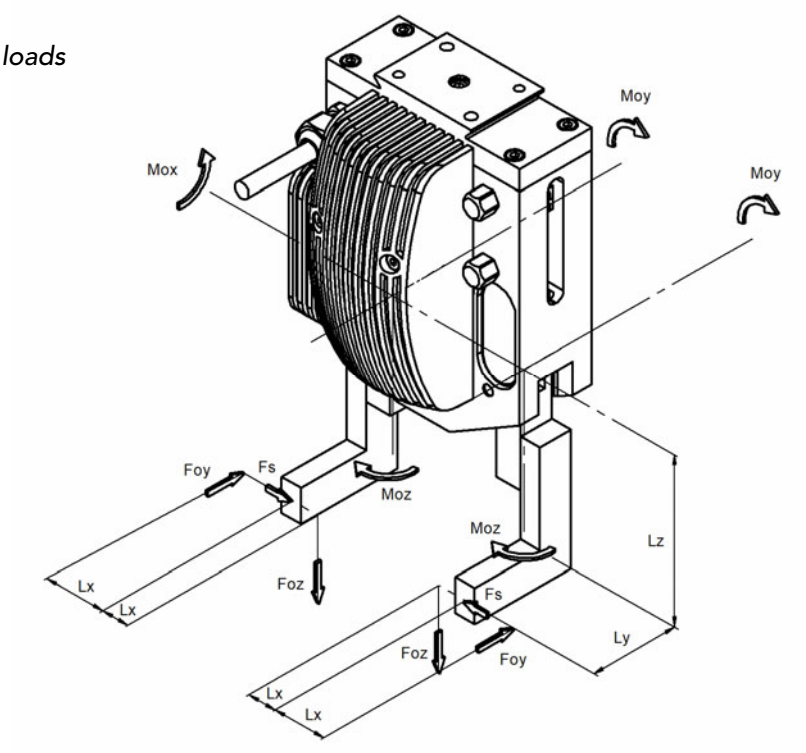
S: Center of gravity of gripping finger
a: Distance between fulcrum and center of gravity
L_z: Distance between fulcrum and clamping point (mm)
F_s: Clamping force per gripping finger

Gripping finger mounting on the inside of the gripper jaw

Gripping finger mounting on the outside of the gripper jaw

2.8. Permissible loads

Definition of the loads



F_s	[N]	Clamping force per gripper finger
F_{oy} , F_{oz}	[N]	Static forces
L_x , L_y , L_z	[mm]	Distances over which force acts
M_{ox} , M_{oy} , M_{oz}	[Nmm]	Static moments

F_s	[N]	See clamping force diagram
F_{oy} perm.	[N]	80
F_{oz} perm.	[N]	400
L_x perm.	[mm]	60
L_y perm.	[mm]	60
L_z perm.	[mm]	120
M_{ox} perm. = $F_{oy} \bullet L_z + F_{oz} \bullet L_y$	[Nmm]	2000
M_{oy} perm. = $F_{oz} \bullet L_x$	[Nmm]	6000
M_{oz} perm. = $F_s \bullet L_y + F_{oy} \bullet L_x$	[Nmm]	3000

When M_{ox}, M_{oy}, and M_{oz} act simultaneously, each moment can reach its permissible maximum. If the action of F_{oz} on the gripper jaw is displaced by L_x, the clamping force F_s is affected as follows:

$$F_{s\,eff} = F_s \pm F_{oz} \bullet \frac{Lx}{Lz}$$

3. Commissioning

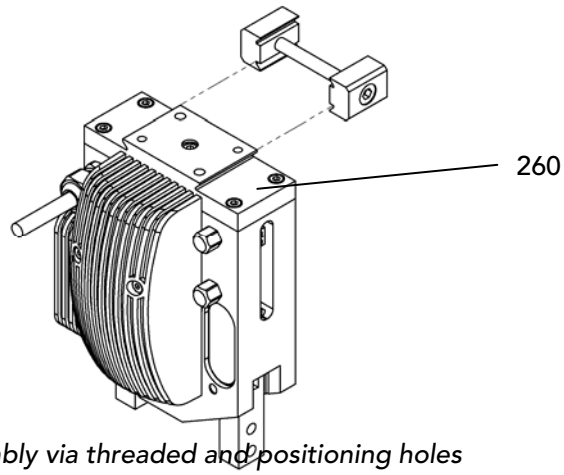
3.1. Installation position and assembly

GWE electrical angular grippers can be installed in any position.

The GWE is assembled by means of Quick Set fixing elements (SLL-20-40, SLL-55-40 or SLR-15-40) on the dovetail of the cover (item 260) or via threaded and positioning holes in the cover (item 260).

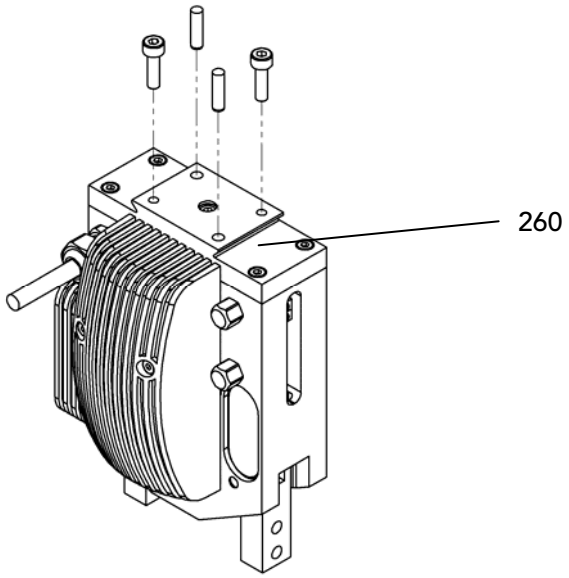
Assembly with Quick Set fixing elements

GWE with SLL-20-40, SLL-55-40, SLR-15-40



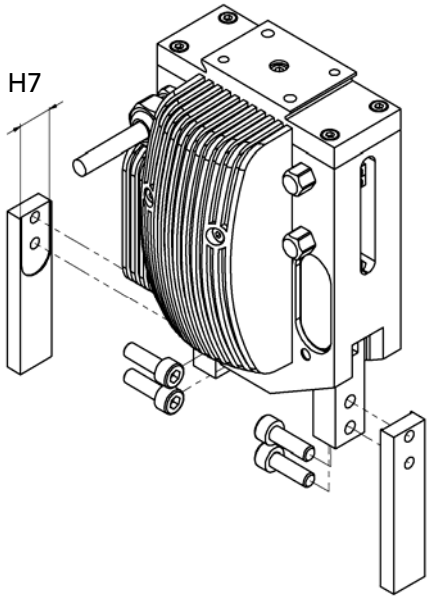
Assembly via threaded and positioning holes

GWE with screws and pins

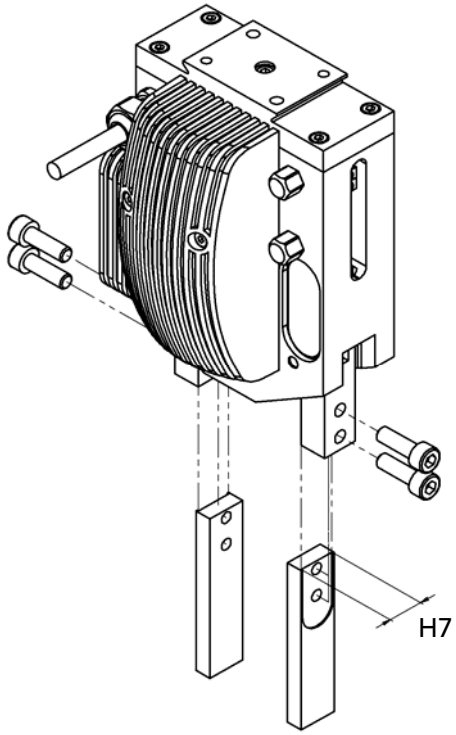


3.2. Mounting the gripper fingers

Mounting the gripper fingers on the outside of the gripping jaws



Mounting the gripper fingers on the inside of the gripping jaws



3.3. Setting the stroke limit when opening

GWE electrical angular grippers are suitable only for external gripping in parallel gripper jaw position. The closed position of the jaws cannot be adjusted.
The opening angle of the gripper jaws (item 30) can be changed by screwing the stop disk in and out (item 300).

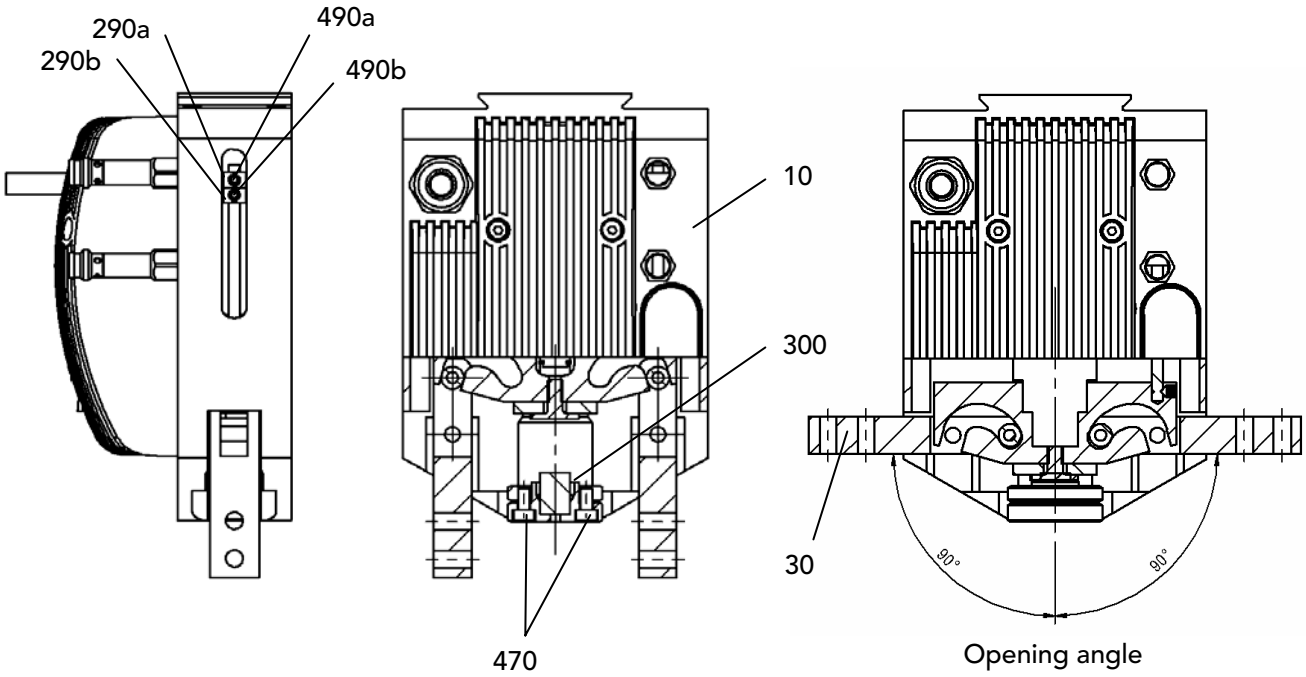
Adjusting the opening angle:

- When increasing the opening angle, first always loosen the lower damper (item 290b) on the threaded pin (item 490b), push to the top damper (item 290a) and fix in place by tightening the threaded pin (item 490b).

Loosen cylinder screws (item 470).
Screw stop disk in or out (item 300) with hexagon socket screw key.
Tighten cylinder screws (item 470).

- The GWE electrical angular gripper must never be operated without an opening stop!
- The maximum opening angle is reached when the stop disk (item 300) is flush with the casing (item 10).
- Non-observance can result in early failure of the gripper!

Adjusting the opening angle



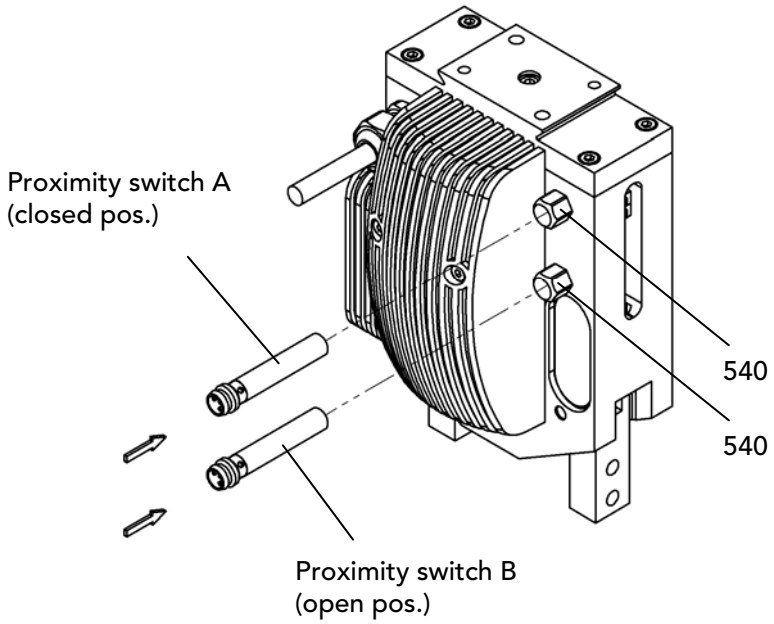
3.4. Installation and connection of the inductive proximity switches

The inductive proximity switches to be installed must fulfill the following conditions:

Switch gap:	2 mm
Flush-mountable	
Casing diameter:	6.5 mm
Minimum casing length (Ø6.5):	19 mm

Mounting a proximity switch is done by inserting it into the fastening nut for the sensor (item 540) until it contacts the end of the casing bore (item 10). It is then fastened by tightening the fastening nut for the sensor (item 540).

Installation of the inductive proximity switches

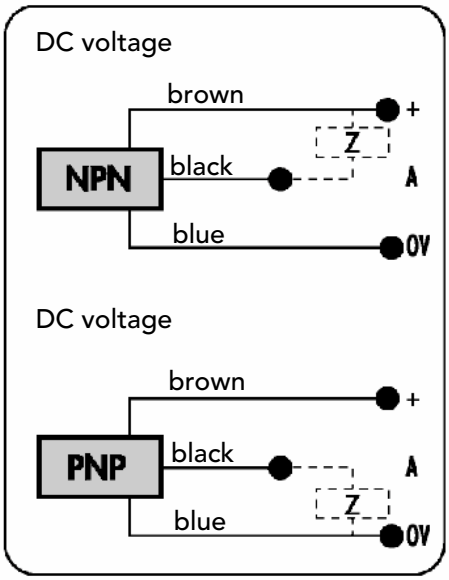


Connecting cable to proximity switch:

– To ensure that forces do not affect the proximity switches, the connecting cables should always be provided with tension reliefs!

The electrical connection is made as shown in the diagram below.

Connection of the inductive proximity switches

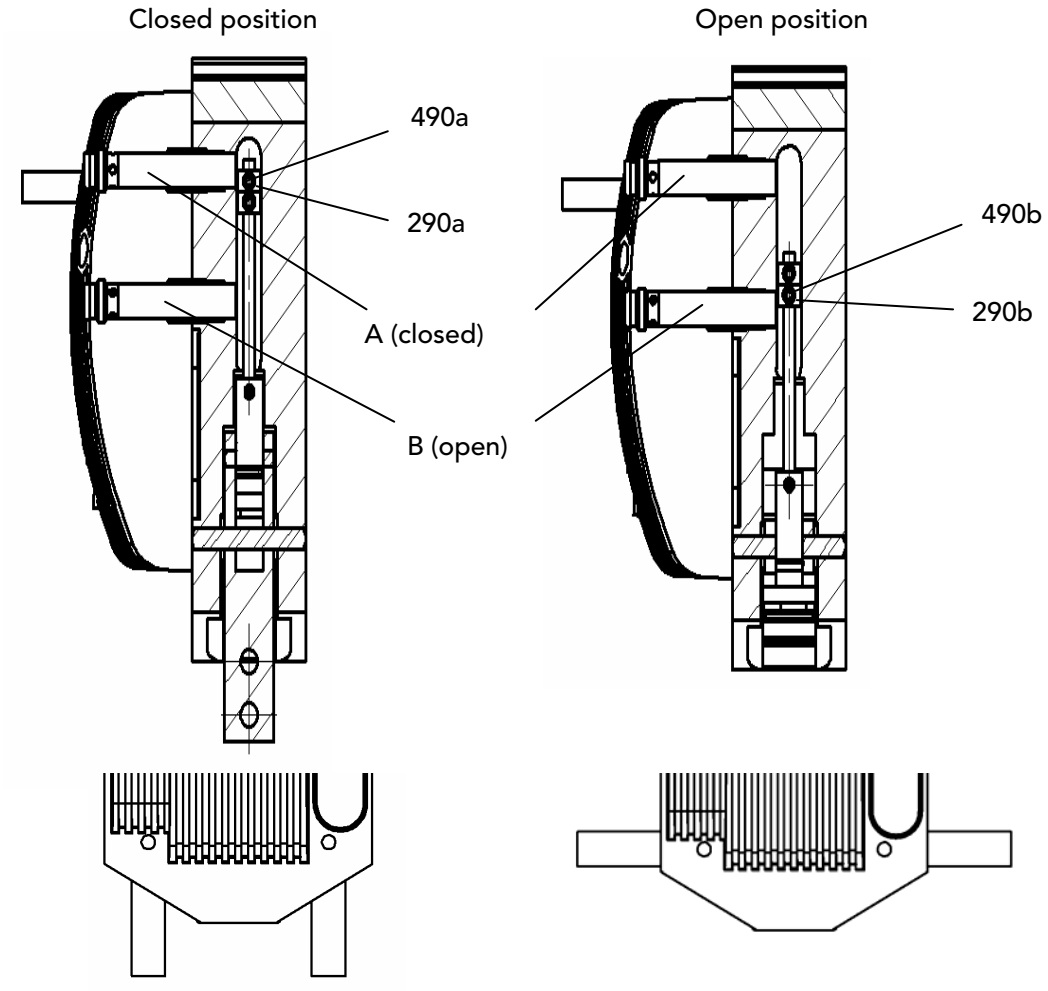


3.5. Setting the proximity switch damper

Closed position:
Close gripper.
Loosen threaded pin (item 490a) and push the top damper (item 290a) until the LED lights on the electrically connected proximity switch "A".
Tighten threaded pin (item 490a); when doing so, ensure that the damper (item 290a) does not contact the casing (item 10).

Open position:
Open gripper.
Loosen threaded pin (item 490b) and push the lower damper (item 290b) until the LED lights on the electrically connected proximity switch "B".
Tighten threaded pin (item 490b); when doing so, ensure that the damper (item 290b) does not contact the casing (item 10).

Setting the proximity switch damper



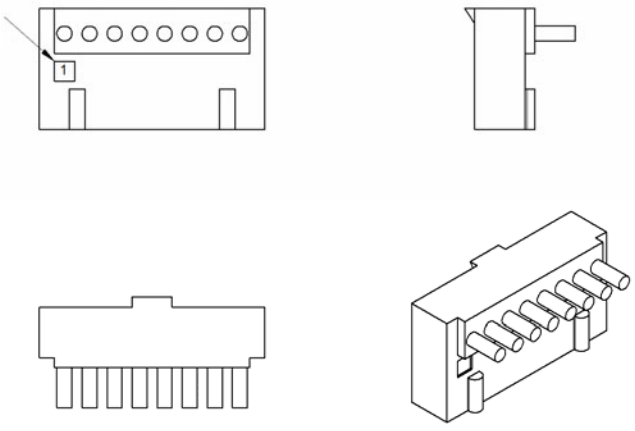
3.6. Internal wiring and cable connections

	Motor		Output cable 10 x 0.25 mm²	
Designation	Wire color	Plug connector	Wire color	Plug connector (item 530)
Motor winding 1	brown	1	white	1
Motor winding 2	red	2	brown	2
Motor winding 3	orange	3	green	3
U Hall sensors	yellow	4	red	4
GND Hall sensors	green	5	blue	5
Hall sensor 1	blue	6	yellow	6
Hall sensor 2	violet	7	grey	7
Hall sensor 3	grey	8	pink	8
-	-	-	black	n.c.
-	-	-	violet	n.c.

Legend:
n.c.: not connected

Plug connector pin assignment

marking



3.7. Wiring the controller

Please refer to Chapter 3.4 "Internal wiring and cable connections" and Operating Instructions BA-100078 ECMR (EC Motor Controller), electrical and software part.

4. Maintenance

4.1. Lubrication

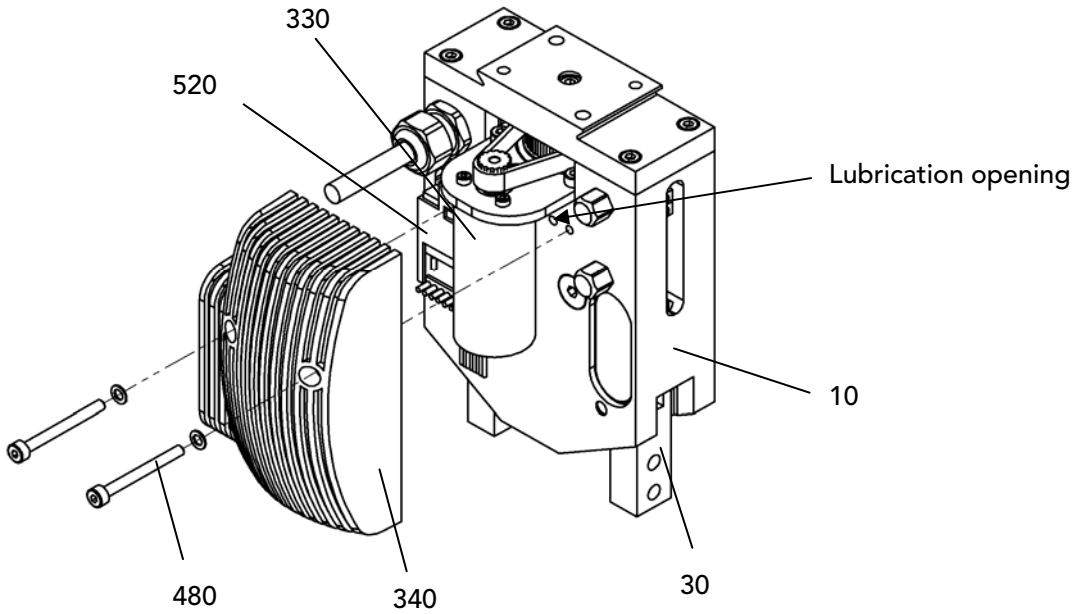
– During maintenance work on the GWE, it must be ensured that the drive energy is switched off and cannot be switched on by unauthorized persons.

It is essential to use only Klüber oil "Paraliq P460" (Montech ref. no. 504721) as lubricant.

Lubrication interval: 800 operating hours

Lubrication of ballscrew:
– Loosen cylindrical screws (item 480) and remove cover (item 340).
– Move gripping jaws (item 30) to parallel position.
– Apply a few drops of lubricant to the ballscrew (item 80) through the lubricating opening in the casing (item 10). Close and open gripping jaws (item 30) several times. Repeat the process 3-4 times.
– Invert cover (item 340) over motor (item 330) and double pin housing (item 520) and fix with cylindrical screws (item 480).

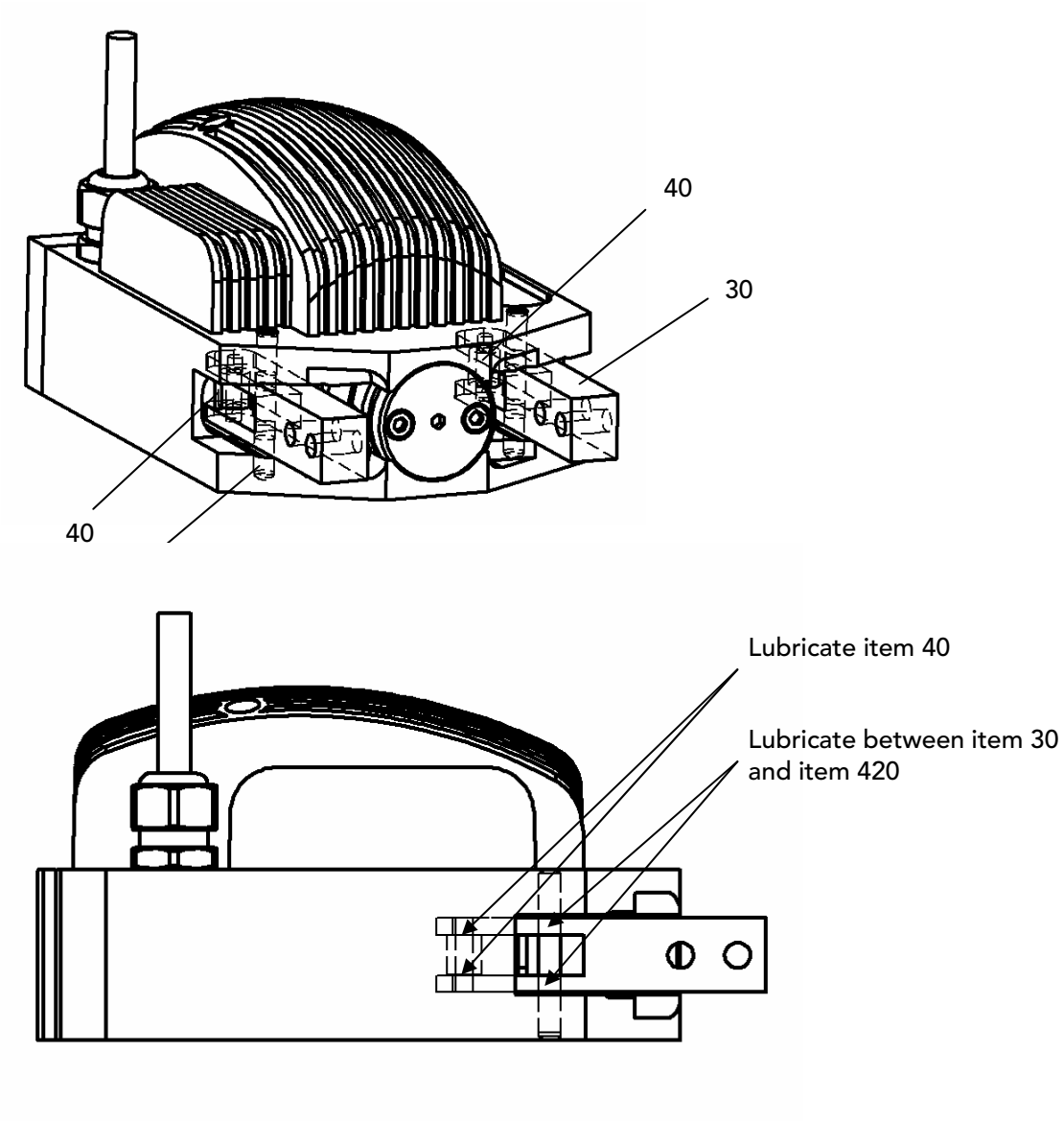
Ballscrew lubrication



In applications with more than 60 cycles/minute, it is advisable additionally to lubricate the guide rollers (item 40) and the rollers (item 30) at the same time:

– Close gripping jaws (item 30) and apply a few drops of lubricant to the guide rollers (item 40) and to the fulcrums of the gripper jaws (item 30) on the cylinder pins (item 420).

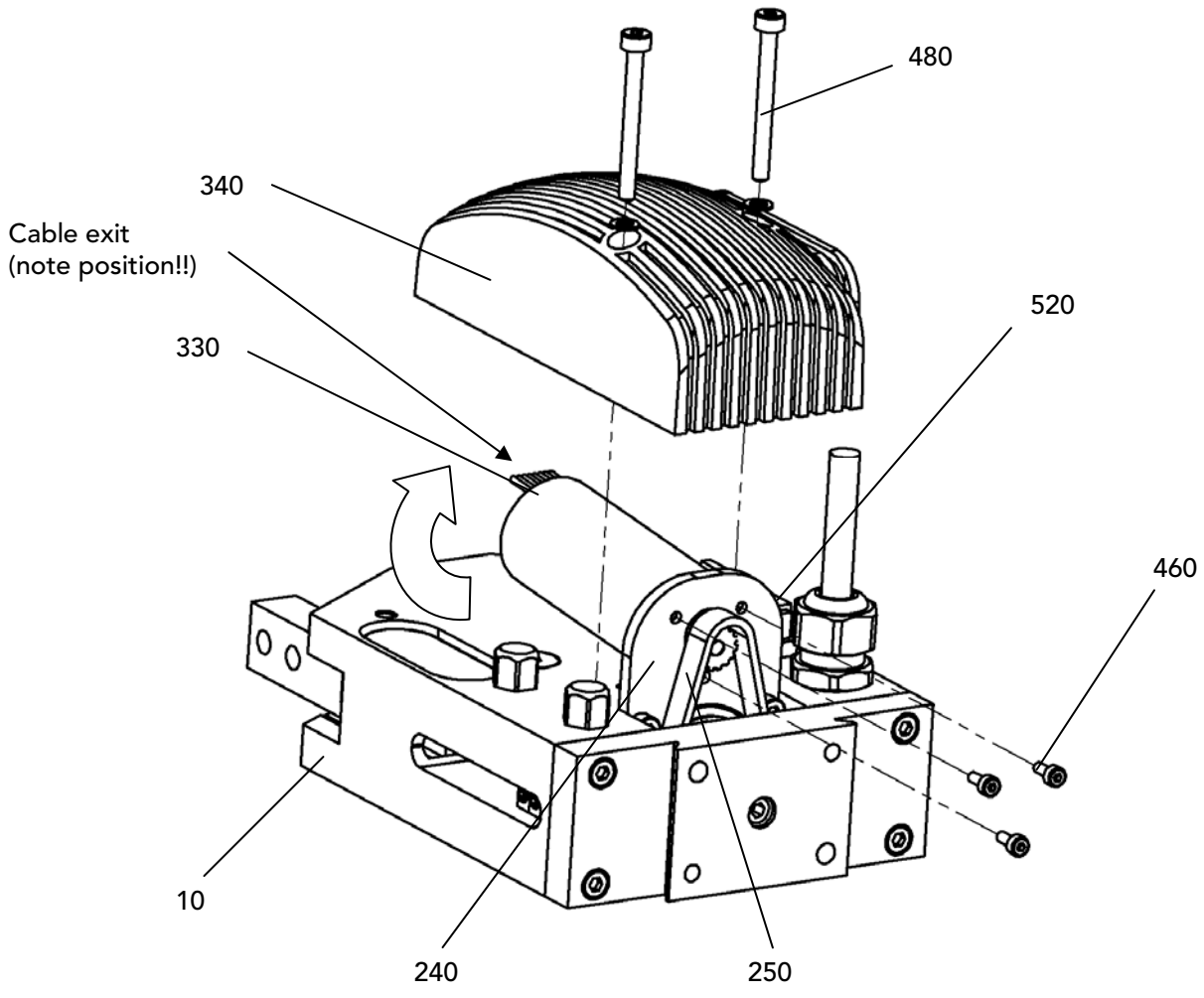
Lubrication the guide rollers and fulcrums



4.2. Replacing the motor

- Loosen cylinder screws (item 480) and remove cover (item 340).
- Pull motor plug connector out of double pin housing (item 520).
- Loosen the cylinder screws (item 460) and remove motor (item 330).
- Push new motor (item 330) into motor flange (item 240) and push the toothed belt (item 250) over the toothed wheel on the motor (item 330) by tilting the motor (item 330).
- Bring motor (item 330) into a position parallel to the casing (item 10) and fix with the cylinder screws (item 460) to the motor flange (item 240) (note position of cable exit!).
- Check toothed belt tension and set the correct tension according to section entitled “Toothed belt tension” if the tension is too low.
- Insert motor plug connecter on the double pin casing (item 520). Note: loop the cable so that the cable cannot make contact with the projecting motor shaft when the cover (item 340) is mounted.
- Invert cover (item 340) over motor (item 330) and double pin housing (item 520) and fix the cylinder screws (item 480).

Motor installation



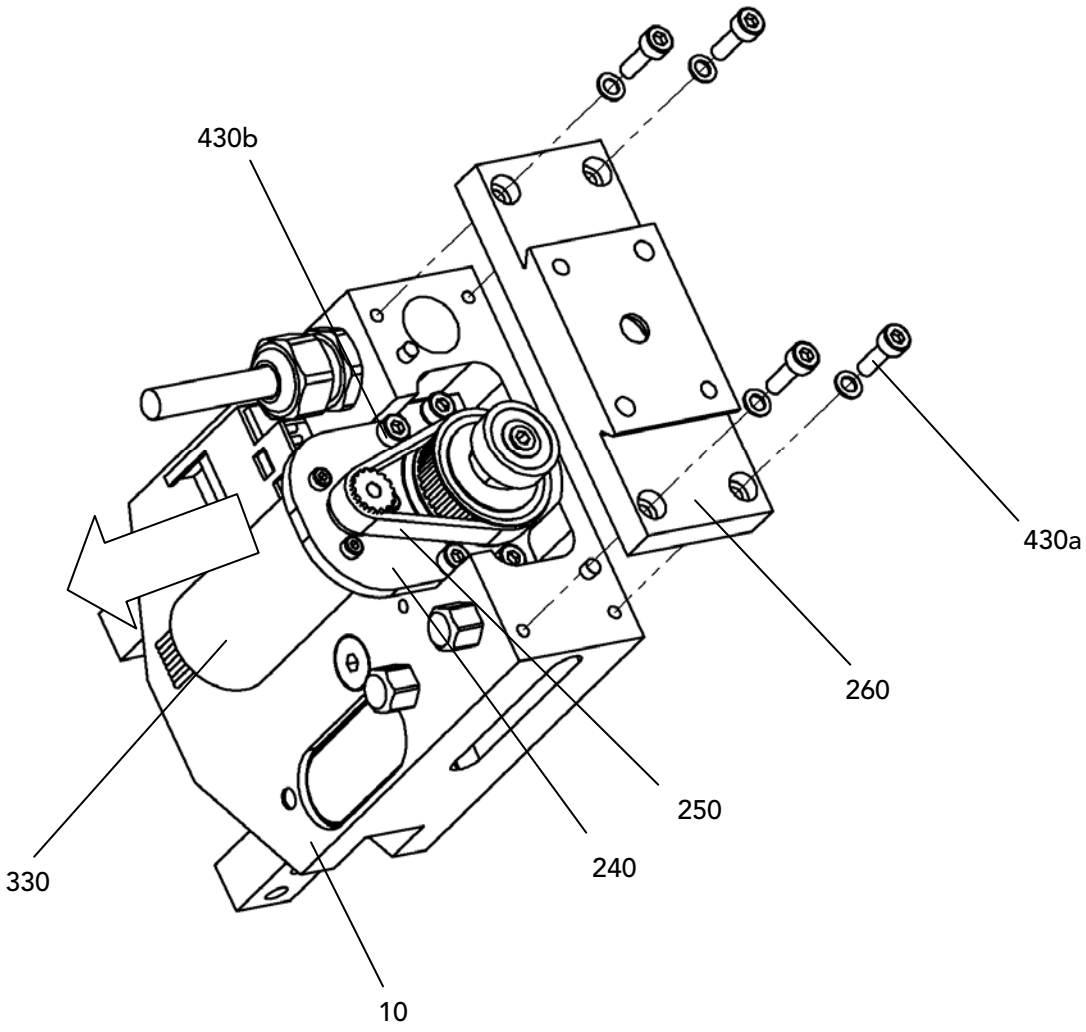
4.3. Toothed belt tension

– Loosen cylinder screws (item 430a) and remove cover (item 260).
– Slightly loosen cylinder screws (item 430b).
– Pull motor flange (item 240) with motor (item 330) away from the housing (item 10) so that the toothed belt (item 250) is stretched without initial tension.

– Excessive tension of the toothed belt (item 250) can lead to destruction of the motor bearing!

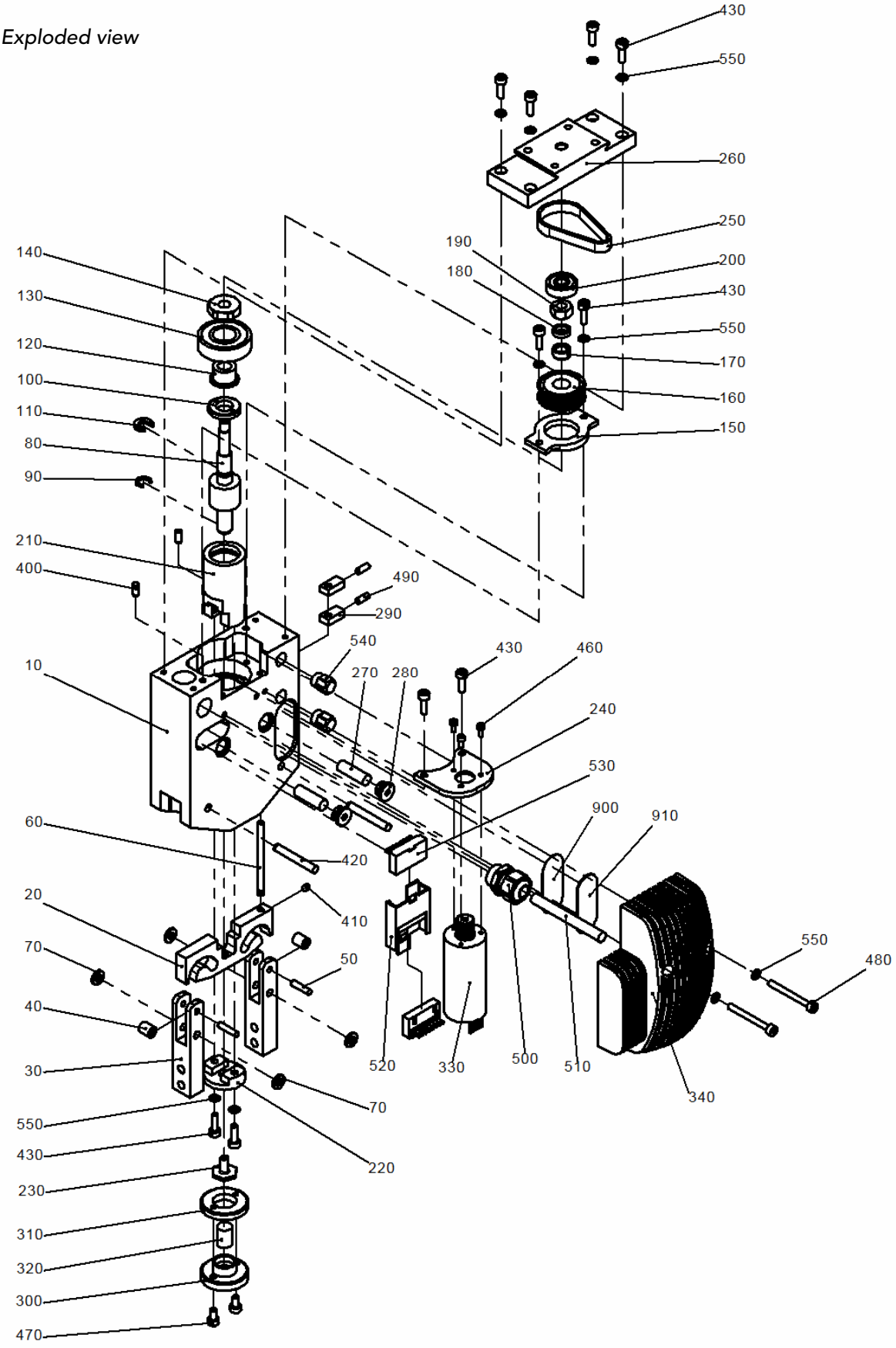
– Hold the motor flange (item 240) and tighten cylinder screws (item 430b).
– Mount cover (item 260) and fix with cylinder screws (item 430a).

Toothed belt tension



5. Parts list for GWE

Exploded view



Item	Sym.	Designation	Ref. no.	Material
	◘	GWE Electrical Angular Gripper	57834	
10	◊	Casing	57401	Aluminum
20	◊	Bracket	56392	Steel
30	◊	Gripping jaw	56273	Steel
40	◊	Guide roller	46078	Steel
50	◊	Cylindrical pin	56499	Steel
60	◊	Rod	57403	Steel
70	◊	Lock washer	520331	Steel
80	◊	Ballscrew	56647	Steel/various
90	◊	Circlip	520045	Steel
100	◊	Adjusting disk	56645	Steel
110	◊	Support ring	57092	Steel
120	◊	Bearing bush	57177	Steel
130	◊	Deep-groove ball bearing	505244	Steel
140	◊	Hexagon nut M7x0,75	57389	Steel
150	◊	Bearing cover	57179	Aluminum
160	◊	Toothed wheel	56649	Aluminum/steel
170	◊	Clamping bushing	510010	Steel
180	◊	Centering sleeve	56405	Steel
190	◊	Hexagon nut M6x0,75	520042	Steel
200	◊	Deep-groove ball bearing	508279	Steel
210	◊	Guide peg	57178	Bronze
220	◊	Journal	56394	Bronze
230	◊	Stop screw	57404	Steel
240	◊	Motor flange	56659	Aluminum
250	●	Toothed belt	520079	PUR
260	◊	Cover	56386	Aluminum
270	◊	Buffer	57394	PUR
280	◊	Closure screw	56660	Steel
290	◊	Damper	56262	Steel
300	◊	Stop disk	57408	Steel
310	◊	Stop adjustment disk	57407	Steel

Item	Sym.	Designation	Ref.No.	Material
320	◊	Buffer stop	57413	NR
330	●	Motor with toothed disk	57528	Various
340	◊	Cover	57464	ABS
400	◊	Cylindrical pin Ø3h6x8	502021	Steel
410	◊	Pointed threaded pin M3x4	520329	Steel
420	◊	Cylindrical pin Ø4h6x30	502043	Steel
430	◊	Cylinder head screw M3x10	502503	Steel
460	◊	Cylinder head screw M2x5	520053	Steel
470	◊	Cylinder head screw M3x6	520043	Steel
480	◊	Cylinder head screw M3x30	506035	Steel
490	◊	Threaded screw M3x8	520330	Steel
500	◊	Cable screw union	520197	Brass
510	◊	Cable	520332	Various
520	◊	Double pin housing	520304	Various
530	◊	Plug connector	520303	Various
540	◊	Sensor fixing nut	507399	Brass
550	◊	Ribbed washer M3	505385	Steel
900	◊	Name plate	41620	Polyester
910	◊	Clear cover	48508	PUR
	●	EC Motor Controller (ECMR)	57332	Various

● These are wearing parts and are available from stock
◊ May not be available ex stock (upon request)
◘ Price-listed items available ex stock

6. General information

6.1. Environmental compatibility and disposal

Materials used:
- Aluminum
- Steel
- Bronze
- ABS (acrylonitrile butadiene styrene)
- PU (polyurethane)
- POM (polyoxymethylene)
- NR (butadiene rubber)
- Brass
- Polyester

Surface treatment:
- Anodization of aluminum
- Blackening of steel
- Coating of plastic

Shaping processes:
- Machining of aluminum, bronze and steel
- Injection molding of plastics
- Extrusion of PUR and NR

Emissions during operation:
None

Disposal:
GWE electrical angular grippers which can no longer be used should be recycled, not as complete units, but dismantled to components and disposed of according to the type of material. The kind of material used for each part is shown in the spare parts lists. Material which cannot be recycled should be appropriately disposed of.

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FLEXIBILITY FOR INNOVATORS ONLY